

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1382

FATTENING STEERS IN THE CORN BELT



FATTENING OF STEERS affords one of the most practical ways of disposing of the corn crop and of many roughages produced on the Corn Belt farm.

This industry favors diversification in agriculture and makes possible a well-balanced distribution of labor throughout the year.

Approximately 75 per cent of the fertilizing constituents of feeds fed to livestock is returned in the manure; consequently when the manure is saved and applied to the land, feeding operations largely maintain soil fertility.

Ability in buying and selling cattle and in combining feeds properly has a direct bearing on the success of beef-cattle feeding.

Quality in feeder cattle favors economical production; uniformity in fat cattle is favorable to increased selling prices.

FATTENING STEERS IN THE CORN BELT.¹

By WM. H. BLACK,

Animal Husbandman, Animal Husbandry Division, Bureau of Animal Industry.

CONTENTS.

	Page.		Page.
I. Feeder cattle-----	1	II. Fattening steers—Continued.	
The feeder supply-----	1	Utilizing grass in the fat-	
Purchasing feeders-----	1	tening ration-----	12
Selecting feeders-----	4	Grain and hay rations with	
II. Fattening steers-----	5	pasture-----	12
Getting steers on full feed--	6	Grain, hay, and silage ra-	
Methods of dry-lot feeding--	7	tions with pasture-----	14
Corn and legume-hay ra-		Important miscellaneous	
tion-----	7	factors-----	16
Silage rations-----	8		
Factors to consider in pre-			
paring rations-----	11		

I. FEEDER CATTLE.

THE FEEDER SUPPLY.

THE BEEF-CATTLE INDUSTRY in the Corn Belt has undergone very marked changes in late years. Not more than a score of years ago there was an abundance of pasture and land was comparatively cheap. To-day, practically all land capable of being tilled is used for crop production. The raising of cattle primarily for beef has been giving way to the production of purebreds for sale as breeding stock. The Corn Belt, however, still supplies most of the fat cattle.

The Great Plains and the Rocky Mountain region, extending from Canada to the Gulf, are the principal breeding grounds for beef cattle. The vast undeveloped ranges are more adapted to growing beef cattle than to fattening. The range cattlemen realize their situation and operate to produce high-grade feeder cattle. The Corn Belt cattle feeders, with an abundance of fattening feeds and limited pasture area, see where they can better afford to purchase feeders from the range area than to raise them on land which is suitable for crop production. By devoting greater areas to grain and hay production, the Corn Belt cattle feeder has found it possible to feed more cattle by raising more feed and maintaining the soil in a high state of fertility.

PURCHASING FEEDERS.

There is an increasing tendency on the part of cattle feeders to purchase their feeder cattle direct from the range, although a comparatively small percentage of the cattle fattened in the Corn Belt has thus far been obtained in this way. One may purchase privately in person, by mail, or through a cooperative association. Organiza-

¹ This bulletin supersedes Farmers' Bulletin 588, Economical Cattle Feeding in the Corn Belt, and Farmers' Bulletin 1218, Beef Production in the Corn Belt.

tions of breeders are being formed in many sections of the country for the purpose of assembling several droves of feeder cattle and selling them at auction. Sales of this nature are usually extensively advertised in order to get a large number of buyers to attend. Buying direct eliminates marketing expenses at the livestock markets and insures against "stale" cattle, that is, cattle held at the markets for several days.

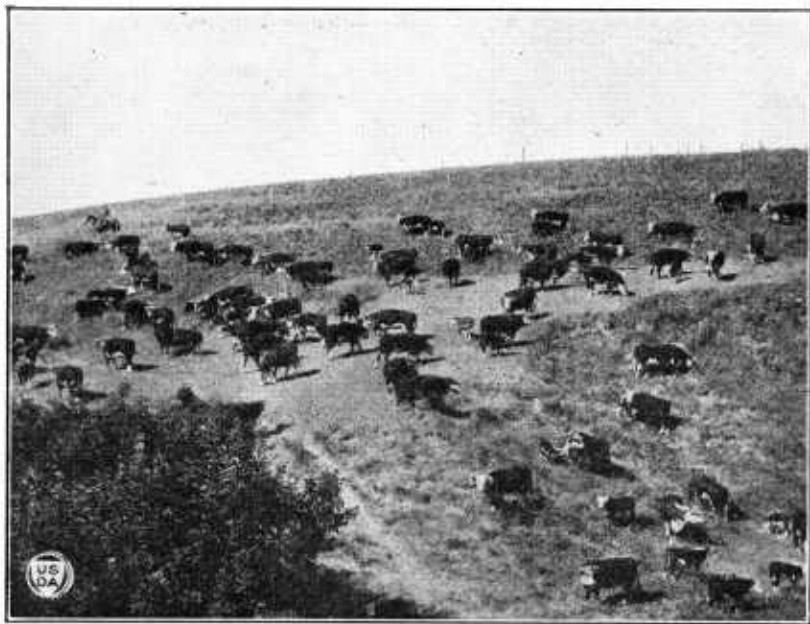


FIG. 1.—Beef cattle utilizing rough land to advantage in the Great Plains region.

Buying at the large livestock markets is preferred by many feeders, because there may be a saving of time, and there is the possibility of buying on a "glutted" market, which usually results in much lower prices. When the receipts are normal, however, there is usually considerable competition, resulting in a price considerably in excess of the range price. The markets serving the Corn Belt are shown in Figure 2 and Table 1.

TABLE 1.—Receipts, slaughter and feeder shipments for 1922 at the 10 largest markets serving the Corn Belt.

Markets.	Receipts.	Slaughter.	Shipments of feeders. ¹
Chicago.....	3,934,498	2,797,363	408,868
Kansas City.....	2,983,094	1,406,845	1,151,256
Omaha.....	1,744,251	915,811	621,124
East St. Louis.....	1,400,333	529,687	274,710
St. Paul.....	1,386,932	783,112	438,933
Fort Worth.....	1,084,201	619,755	225,130
Sioux City.....	746,983	300,954	334,719
Denver.....	656,245	124,488	413,138
St. Joseph.....	654,552	403,493	176,041
Indianapolis.....	508,814	238,372	43,525

¹ A considerable number of the cattle received are reshipped to other markets for slaughter.

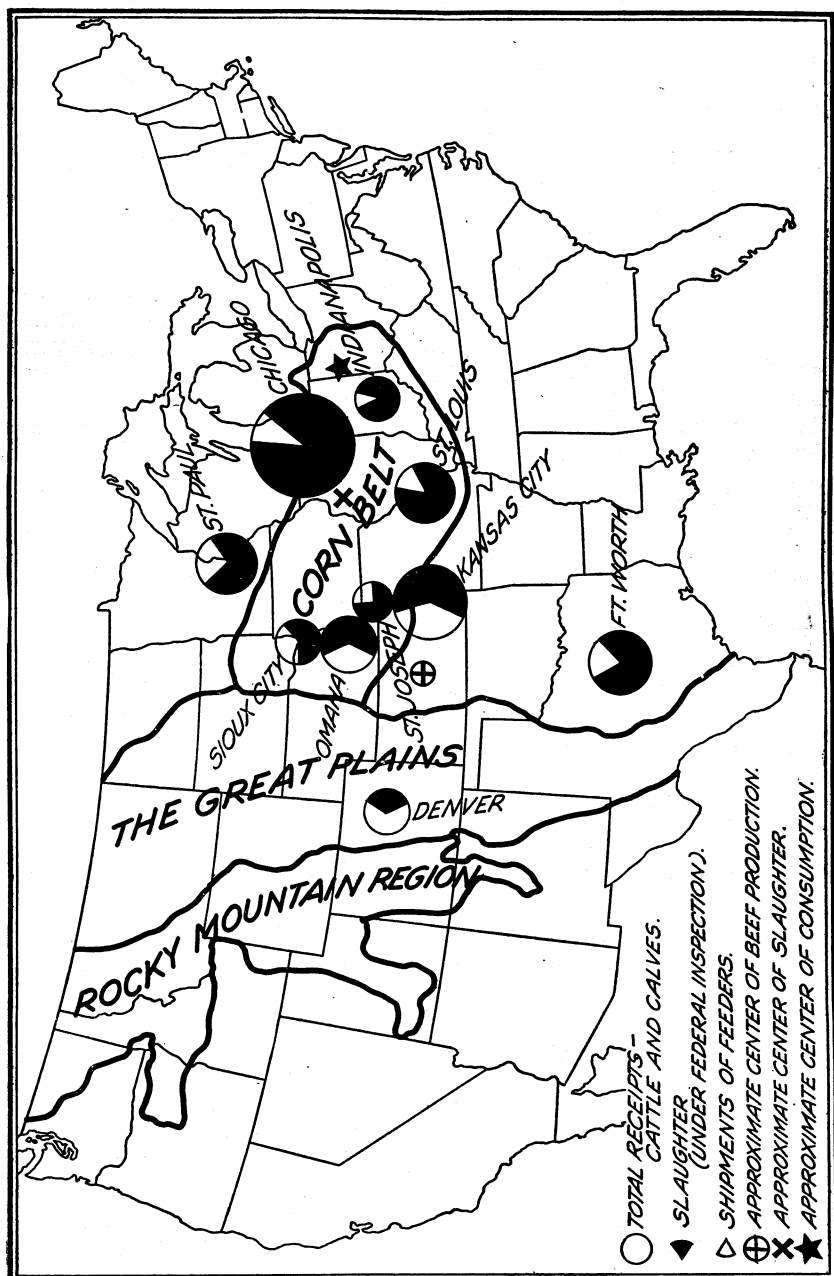


FIG. 2.—Receipts, slaughter and feeder shipments, graphically shown, for 1922 at the 10 largest markets serving the Corn Belt.

Chicago is the largest livestock market, based upon receipts, but does not supply so many feeder cattle as Kansas City, Omaha, St. Paul, or Denver. Kansas City, the largest feeder-cattle market, is conveniently located to receive cattle from the West and Southwest, whereas the markets further north receive their supply from the West, Northwest, and Canada.

Buying and selling ability plays as important a part as skillful feeding in the successful handling of feeder cattle. Successful feeders study market conditions. In some seasons certain weights and classes of cattle may be purchased more economically than others. The cattle feeder should study the demands of the market for certain seasons and feed the kind of cattle that will be in demand when they are ready for market.

Ordinarily, early fall buying is preferable, as competition between packers and feeders usually increases as winter approaches. Cattle intended for fattening on grass the following summer should be purchased in the fall if there is an abundant supply of cheap roughage on hand.

Stockers or feeders can be wintered largely on such roughages as silage, stover, hay, and straw. The following daily rations are suggested for wintering stocker calves:

Ration 1:	Pounds.	Ration 3:	Pounds.
Silage-----	15	Alfalfa or clover hay-----	10
Clover or alfalfa hay-----	4	Straw or stover-----	5
Ration 2:		Ration 4:	
Silage-----	15	Mixed hay-----	10
Cottonseed or linseed meal--	$\frac{1}{2}$	Straw or stover-----	5
Straw or stover-----	5	Cottonseed or linseed meal--	1

For stocker yearlings these rations should be increased about one-half.

SELECTING FEEDERS.

In selecting feeders, quality, age, uniformity, and condition are the factors which should receive careful consideration.

Quality.—The higher the grade or quality of the feeder the more economical will be its use of feed. The high-grade steer will have greater capacity for feed and will make more economical use of it in the way of laying on flesh in the regions of the valuable cuts. The buyer should keep this fact in mind, but should not be influenced to such a degree as always to buy the highest priced feeders.

Age.—Two-year-old feeder steers averaging between 800 and 850 pounds at time of going on feed are usually in greatest demand. The quantity and nature of available feeds and the length of feeding period are factors which should largely determine the age of cattle to feed. The younger the animals the longer will be the feeding period. Young cattle put their feed to three distinct uses: First, maintenance; second, growth; third, fat. All animals require a certain amount for maintenance, but the amount required for growth diminishes gradually with the age of the animal. As growth ceases, more of the feed above that required for maintenance goes toward fat formation. Older cattle, therefore, fatten in a much shorter time. Mature feeders fatten in 3 or 4 months, 2-year-olds in from 5 to 7 months, yearlings in 8 to 10 months, and calves in 10 to 12 months.

The kind and quantity of feed must be considered in determining the age of cattle to feed. An abundance of feed makes possible a long feeding period and the feeding of younger cattle to advantage. Older cattle use roughages more advantageously, but in general young animals make more economical use of all feeds.

Mature cattle require from 9 to 11 pounds of digestible nutrients, depending upon the feeds used in the ration, to make a pound of gain, whereas yearlings require from 6 to 8 pounds, and calves only 4 to 6 pounds.

Uniformity.—Three or four months' difference in age means considerable difference in size with young cattle, but relatively little

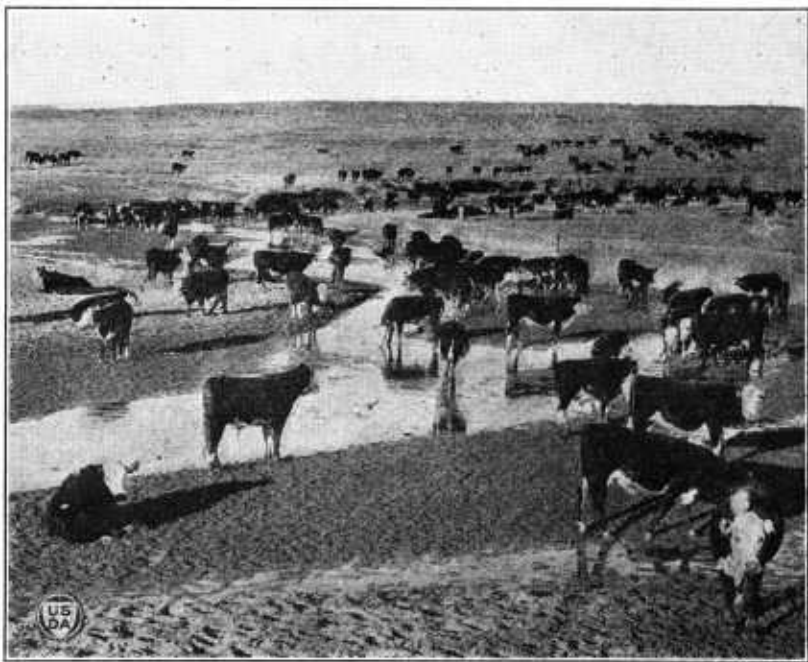


FIG. 3.—Two-year-old feeder steers in the Great Plains region, assembled for delivery.

with the older ones. Older cattle also usually show more uniformity in finish. A uniform drove of cattle (fig. 4) is always attractive, and the buyer is willing to pay more for them.

Condition.—Cattle feeders usually prefer to buy thin cattle for the feed lot. However, prices of cattle and feed should be considered in this connection. When cattle are relatively cheap and feeds high, cattle possessing considerable fat are preferable. Feeders in good flesh are usually sought for short feeding periods.

II. FATTENING STEERS.

The primary objects in fattening steers are to utilize roughages for which there is little demand, to keep the soil in a high state of productivity by feeding the crops on the farm and returning the manure to the land, and to increase the income from farm operations.

The fattening of cattle throughout the Corn Belt area is of two types—dry-lot fattening and fattening on grass. Most cattle fattened in the Corn Belt are dry-lot fed and are marketed before July 1. Very few cattle fed heavily on grain during the winter and spring months are ever put on grass the following summer.

In some sections of Missouri feeders purchased in the fall are “roughed” through the winter largely on cornstalk fields, straws, hays, stover, and silage. In the spring the cattle are turned on to grass and fed a half-grain ration. Cattle handled in this way usually are marketed before September 1.

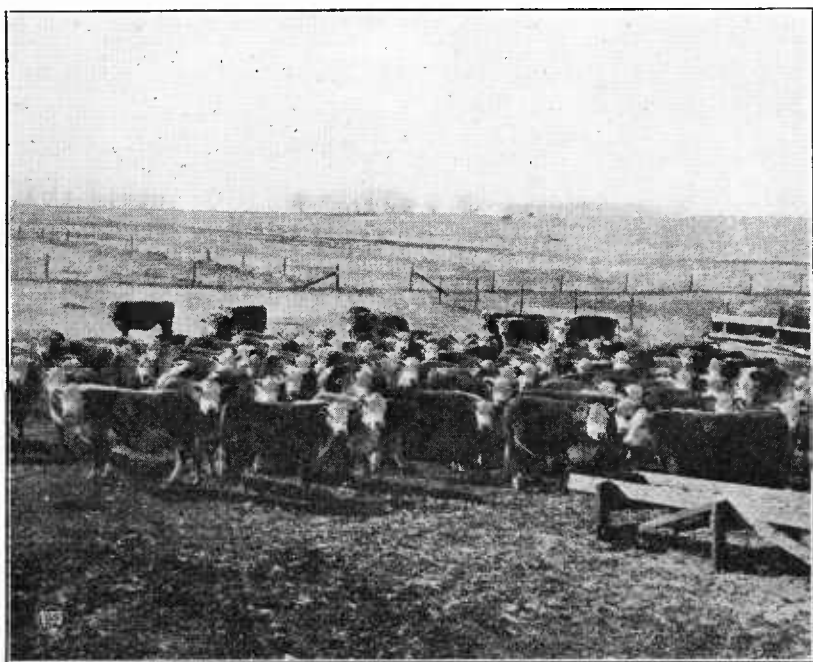


FIG. 4.—A choice drove of Colorado range steers. They possess excellent type, conformation, quality, and are dehorned—characteristics much sought in feeder cattle by Corn Belt feeders.

GETTING STEERS ON FULL FEED.

Starting steers on feed requires careful management. Gradual increases in the quantities of feed in the ration, as determined by careful observation, are essential to success in getting steers up to full eating capacity. The time required depends primarily upon the length of feeding period and is influenced by the age of the cattle. The feeding period for 2-year-olds varies from 5 to 7 months, with an average, in the Corn Belt, of about 175 days. Older cattle fatten in a shorter period; younger cattle require a still longer period. As an illustration, when 2-year-old cattle are to be fed a corn-and-clover ration for a 6-months' period, a good practice is to increase the quantities of feed gradually so that the cattle will be on full feed in not less than 30 days. They can be handled safely as follows: Start

with 2 pounds of corn the first day and increase 1 pound a day until 10 pounds is reached. Hold at this point for four days. Then increase 1 pound every three days until 20 pounds is reached, which will be in about 40 days. The steers can receive all the roughage they are able to consume from the beginning without any ill effects.

When protein concentrates are used in the fattening ration, increases should be even more gradual than with corn. A conservative quantity of cottonseed or linseed meal to start cattle on would be half a pound.

In a general way all concentrates should be gradually increased as the feeding period advances, while roughages should be decreased.

Feeder cattle from the range areas are usually not accustomed to eating grain. In fact, very few have ever eaten feeds other than grass and hay. Under these conditions, cattle can usually be taught to eat corn more readily by feeding them corn fodder on grass pasture rather than inducing them to eat out of a feed bunk at the start.

METHODS OF DRY-LOT FEEDING.

There are various rations used in the dry-lot feeding, but two combinations of feeds stand out rather prominently. In those areas where legume hay, such as clover and alfalfa, is produced abundantly, the standard ration is corn and hay. In other areas, where legumes are less thrifty, silage and a protein meal, such as cottonseed or linseed, are fed in combination with corn and a mixed hay.

CORN AND LEGUME-HAY RATION.

Alfalfa and clover hay, because of their high protein content, are the dry roughages that are by far the most popular with cattle feeders. Commercial concentrates need not be supplied to the fattening ration if liberal amounts of these hays are given. In some sections of the Corn Belt, however, roughages can be supplied more economically by using stovers, fodders, or straws, and protein can be supplied more cheaply in concentrates than in roughages. In other sections, as in Nebraska, where large crops of alfalfa are produced at considerable distance from railway shipping stations, it is seldom necessary or advisable to purchase commercial concentrates as a source of protein.

Clover has practically the same feeding value as alfalfa in a ration for fattening beef cattle. The same quantity of hay in each case should give nearly equal results.

The quality of the hay has more influence on its feeding value than the kind of legume from which it is made. Clover or alfalfa should by all means be grown in rotation on all Corn Belt farms, but its use in the beef-cattle-fattening ration must be governed by the quantity of other roughages on the farm and the relative prices of protein in legume hay and the protein concentrates. Generally speaking, when the supply of home-grown legume hay is ample, its use in the ration is preferable to the use of concentrate, since, used as a source of roughage and fed in reasonable amounts, it will supply also the necessary amount of protein to fattening cattle.

TABLE 2.—Comparison of corn and hay with corn, hay, and meal for fattening steers in the Corn Belt.

Item.	Ration.	
	Corn and legume hay.	Corn, legume hay, and protein meal.
Total number of steers fed.....	7,696	2,357
Total number of farms.....	224	65
Average number of steers per drove.....	34.4	36.3
Average length of feeding period..... days.....	134.1	144
Average initial weight per steer..... pounds.....	825.8	755.3
Average final weight per steer..... do.....	1,111.4	1,040.3
Average total gain per steer..... do.....	285.6	285.0
Average daily gain per steer..... do.....	2.13	1.98
Daily feed per steer:		
Corn..... do.....	20.8	18.5
Hay..... do.....	8.7	7.3
Protein meal..... do.....		1.1
Feed consumed per 100 pounds gain:		
Corn..... do.....	974	933
Hay..... do.....	409	370
Protein meal..... do.....		55

Table 2 gives a comparison of a corn-and-hay ration with corn, hay, and a protein meal, when fed to fattening steers. The data in this and other tables in this bulletin have been compiled from cooperative investigations (1919-1922) with the Bureau of Agriculture Economics, United States Department of Agriculture, and the State agricultural colleges of Illinois, Indiana, Iowa, Missouri, and Nebraska.

The figures in the preceding table show that the majority of cattle feeders using a legume hay do not use a protein concentrate. A ration of corn and legume hay made 0.15 pound greater gain per head per day over the same ration with protein meal in addition. In producing 100 pounds of gain 41 pounds of corn and 39 pounds of hay replaced 55 pounds of cottonseed or linseed meal.

SILAGE RATIONS.

The use of stovers and straws in beef-cattle rations has a direct bearing on the economy of gains. All roughage of this nature produced on the farm should be used on the farm. With the fattening animal a certain amount can be advantageously used when supplemented with concentrates and other roughage. In the fattening ration this class of roughage has its greatest usefulness when fed along with the silage.

A certain amount of dry roughage is beneficial in any ration containing silage. This can be supplied most economically by stover or good straw. Stover is the harvested and dry-cured stalks and leaves of corn and similar plants after the grain has been removed; in the Corn Belt, it is mostly corn stover.

Fodder, in the Corn Belt, is harvested and dry-cured corn or similar coarse plants like sorghum when the whole plants, both herbage and grain, are fed together. In the eastern area of the Corn Belt very little is used in that form in the fattening ration. The corn is husked out during the winter and the remaining stover fed as roughage.

The small grain straws are valuable as a source of roughage in all sections of the Corn Belt. Oat straw is the most valuable as a feed. Barley straw, while superior to wheat straw in feeding value, is not produced in sufficient quantity to be as important a roughage as wheat straw.

Straw should not be wasted by burning. Good, bright straw should be kept before beef cattle during the winter months. It is relished more during the cold weather; cattle do not eat much straw in warm weather if they have access to other feed. Experienced feeders and farmers utilize as much good straw as possible during the coldest weather. The poorest straw, so long as it is dry, should be utilized as bedding. The cattle should have an oversupply of bedding rather than too little, as the manure produced is, with very few exceptions,

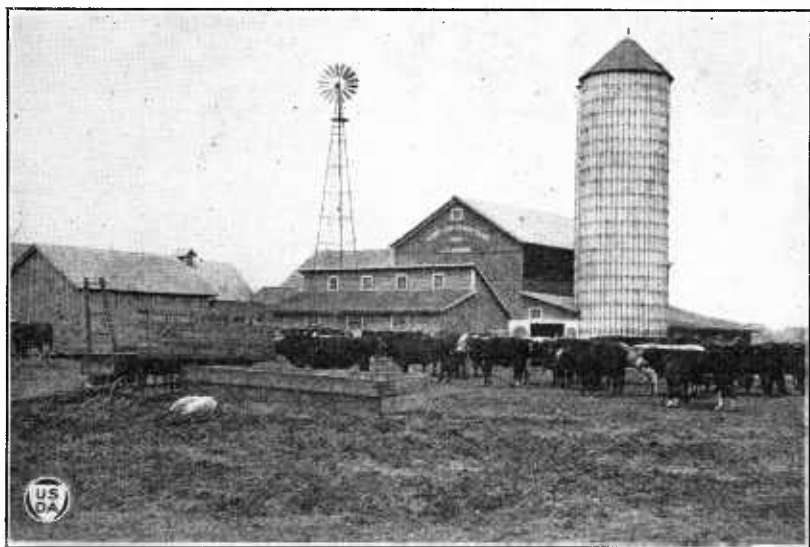


FIG. 5.—Typical Illinois feed lot and equipment. It is customary for the cattle to use part of the general barn for shelter. The silo is an important part of the equipment in that State.

worth more than the cost involved in handling the bedding and in applying the manure to the land.

Protein concentrates in some form are used quite generally in silage rations, especially in sections that do not produce a sufficient supply of clover or alfalfa hay to supply the necessary protein in the ration. Supplying protein is of more concern to the cattle feeder than supplying the other constituents of the ration, because the protein constituent usually has to be purchased. Cottonseed meal or cake usually supplies the cheapest protein in a concentrated form. Many grades of cottonseed products are on the market. It is quite essential that the purchaser examine the analysis and purchase the grade that will supply protein most cheaply. For example, cottonseed meal running 40 per cent protein and valued at \$60 a ton is preferable to meal with 36 per cent protein and priced at \$55 a ton. A ton of meal containing 40 per cent protein has 800 pounds of

protein and at \$60 a ton the protein would cost 7.5 cents a pound. A ton of meal containing 36 per cent protein has 720 pounds of protein; and at \$55 a ton for the meal the protein would cost 7.6 cents a pound. The 36 per cent meal at \$54 a ton would supply protein at the same price as 40 per cent meal at \$60 a ton. The figures set forth in Table 3 should be a guide in determining the cheapest source of protein at various prices of feed.

TABLE 3.—Cost of 1 pound of crude protein in feeds most commonly used as a source of protein in Corn Belt feeding.

Price of feed per ton.	Cost per pound of crude protein. ¹				
	Clover hay.	Alfalfa hay.	Wheat bran.	Linseed meal.	Prime cottonseed meal. ²
Dollars.	Cents.	Cents.	Cents.	Cents.	Cents.
5.00.....	1.79	1.56			
7.50.....	2.68	2.34			
10.00.....	3.57	3.12			
12.50.....	4.47	3.90			
15.00.....	5.36	4.69	4.69		
17.50.....	6.25	5.46	5.46		
20.00.....	7.14	6.25	6.25	2.86	2.56
22.50.....	8.04	7.02	7.02	3.21	2.83
25.00.....	8.93	7.81	7.81	3.57	3.20
27.50.....	9.83	8.59	8.59	3.92	3.52
30.00.....	10.71	9.37	9.37	4.28	3.85
35.00.....	12.50	10.94	10.94	5.00	4.49
40.00.....	14.29	12.50	12.50	5.71	5.13
45.00.....		14.06	14.06	6.43	5.77
50.00.....		15.62	15.62	7.14	6.41
55.00.....			17.19	7.86	7.05
60.00.....			18.75	8.57	7.69
65.00.....				9.28	8.33
70.00.....				10.00	8.97

¹ The feeds contain crude protein approximately as follows: Clover hay, 14 per cent; alfalfa hay and wheat bran, 16 per cent; linseed meal, 35 per cent; and prime cottonseed meal, 39 per cent.

² Cottonseed meal is sold in three grades: Choice, containing at least 41 per cent protein; prime, with at least 38.6 per cent protein; and good, containing at least 36 per cent protein. Meal falling below 36 per cent protein is classed as cottonseed feed. The prime grade is used most extensively.

When silage is used it supplies the bulk of the roughage. Corn is the crop most generally used for silage, and in this bulletin the term silage refers to corn silage. Sorghum, sunflowers, and legumes are sometimes used in those localities which are on the extreme edge of the Corn Belt, such as western Kansas and Nebraska and western and northern South Dakota. The use of silage depends largely on the supply and value of other roughage. Ordinarily, an abundance of cheap roughage lessens the use of silage. When roughage is scarce and high-priced, silage should be used more extensively.

When corn is of good marketable quality and high priced, it is ordinarily good policy to limit the corn ration and to supply more protein concentrates along with silage. This will be influenced somewhat by the price of concentrates, as an additional quantity of concentrates is usually required when corn is decreased in the ration.

Table 4 shows the three most popular silage rations used in the Corn Belt. Of these the ration of corn, hay, and protein meal with the silage is most generally used.

TABLE 4.—*Silage rations used for fattening steers in the Corn Belt.*

Item.	Ration.		
	Corn, hay, and silage.	Corn, hay, protein meal, and silage.	Corn, protein meal, straw, and silage.
Total number of steers fed.....	1,373	4,492	1,095
Total number of farms.....	38	112	25
Average number per drove.....	36.1	40.1	45.6
Average length of feed period..... days.....	142.8	164.4	151.8
Average initial weight per steer..... pounds.....	804.5	833.4	862.5
Average final weight per steer..... do.....	1,058.7	1,120.1	1,132.3
Average total gain per steer..... do.....	254.2	286.7	269.8
Average daily gain per steer..... do.....	1.78	1.74	1.78
Daily feed per steer:			
Corn..... do.....	14.1	10.0	10.2
Hay (mixed)..... do.....	5.4	5.0	.....
Protein meal..... do.....	.....	1.5	2.0
Straw..... do.....	.....	.....	3.37
Silage..... do.....	26.6	38.4	31.2
Feed consumed per 100 pounds gain:			
Corn..... do.....	736	575	572
Hay (mixed)..... do.....	303	289	.....
Protein meal..... do.....	.....	88	109
Straw..... do.....	.....	.....	183
Silage..... do.....	1,495	2,209	1,751

A study of Table 4 shows that as the quantity of silage is increased in the ration the corn is decreased and the length of feeding period increased. In comparing the corn-hay-silage ration with the same ration with protein meal added, it is observed that approximately an additional 4 pounds of corn per head per day over the amount fed in the silage-protein meal ration practically replaced 1.5 pounds of protein meal and 11.8 pounds of silage in making similar daily gains.

The last ration in Table 4—corn, protein meal, straw, and silage—produced similar daily gains. An additional half pound of protein meal over the amount used in the corn-hay-protein meal ration with 3.3 pounds of straw replaced 5 pounds of hay and 7.2 pounds of silage in producing approximately the same daily gain.

FACTORS TO CONSIDER IN PREPARING RATIONS.

The combination of available feeds that will make the most economical gains is the important factor to consider in compounding rations. The animal should receive a ration which is balanced or as nearly balanced as is consistent with the practical and logical use of feeds on the farm. An abundance of a certain kind of feed on the farm may make the feeding of a ration which is not perfectly balanced more practicable and economical than a strictly balanced ration. The use of roughages and other home-grown feeds is essential. More or less feed is wasted by overfeeding. With the exception of dry roughages, cattle should not receive more feed at a feeding than they will clean up within an hour. Cattle should always be hungry at feeding time. Water and salt should be before them at all times.

In combining feeds for a ration, the source of protein should not be overlooked. It should be supplied in the form of either a legume hay or a protein concentrate. Any combination of feeds that does not possess protein from one of these sources is a poor ration for fattening cattle.

The following rations represent the average daily rations for the feeding period for cattle weighing from 750 to 825 pounds at the beginning, and 1,150 to 1,200 pounds at the close of the feeding period, as used extensively by cattle feeders in the Corn Belt:

Ration 1:	Pounds.	Ration 4:	Pounds.
Corn-----	20	Corn-----	14
Legume hay-----	8.5	Mixed hay-----	5.5
Ration 2:		Silage-----	26.5
Corn-----	18	Ration 5:	
Legume hay-----	7.5	Corn-----	10
Protein meal-----	1	Mixed hay-----	5
Ration 3:		Protein meal-----	1.5
Corn-----	20	Silage-----	38
Mixed hay-----	5	Ration 6:	
Protein meal-----	2	Corn-----	10
		Protein meal-----	2
		Straw-----	3
		Silage-----	30

In addition to the kinds and amounts of feeds given in the above rations, salt and clean, fresh water should be accessible at all times.

UTILIZING GRASS IN THE FATTENING RATION.

High-priced land suitable for grain production in the Corn-Belt area can hardly be profitably kept for pasture for the production of beef for market. However, there are many farms having rough land that can be utilized best as a permanent pasture. Gains made by cattle on pasture are usually the most economical. When cattle are "roughed" through the winter, largely on cheap roughages, they can be marketed early the following fall at a cost materially lower than would result from dry-lot feeding.

Cattle to be finished in the summer on grass, with possibly the addition of a little corn or other supplement in the fall, should not be fed heavily during the winter, but they should receive enough to maintain their weight. If they can be kept in a healthy, thrifty condition during the winter months they will do better on grass the following summer than if heavily grain fed during the winter.

Feeders purchased in the fall can be wintered satisfactorily on cornstalk fields, silage, straw, and hay. If silage is used and legume hay is not available, the use of a small amount of cottonseed meal or linseed meal is advisable.

Comparatively few cattle in the Corn Belt area receive pasture throughout the feeding period, yet a large number are supplied with pasture for a considerable time.

GRAIN AND HAY RATIONS WITH PASTURE.

As in the dry-lot feeding, the corn and legume hay ration appears to be the most desired with Corn Belt cattle feeders. Out of an average total feeding period of approximately 190 days, the cattle fed these rations were on pasture an average of 75 days.

Table 5 shows a comparison of results with cattle receiving pasture, corn, and legume hay, and a similar ration with protein meal in addition.

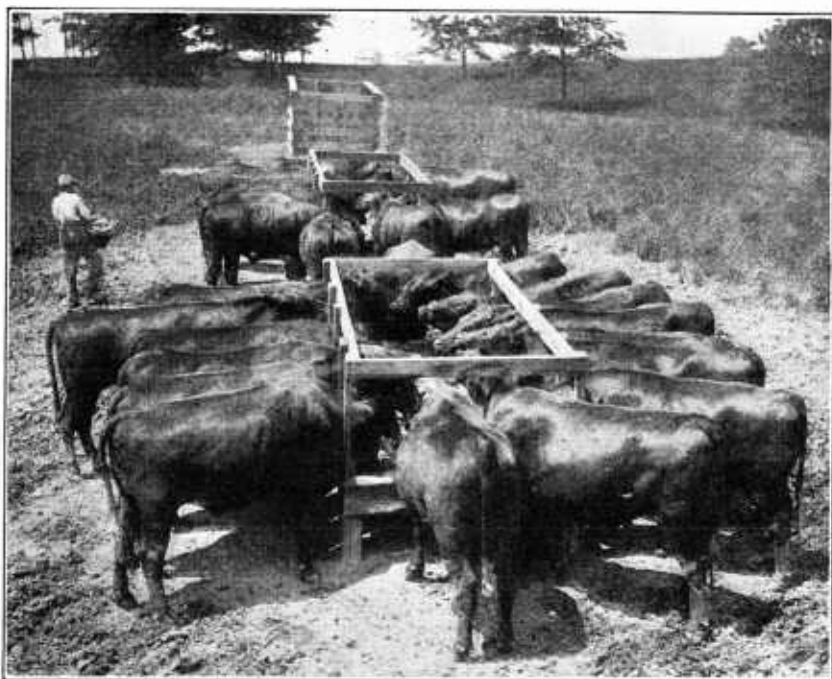


FIG. 6.—Fattening steers on grass, supplemented with grain.

TABLE 5.—Comparison of grain and hay rations for fattening steers on pasture in the Corn Belt.

Item.	Rations.	
	Corn, legume hay, and pasture.	Corn, legume hay, protein meal, and pasture.
Total number of steers fed.....	9,753	2,198
Total number of farms.....	274	57
Average number per drove.....	35.6	38.4
Average length of feed period..... days.....	192.9	132.8
Average number of days in pasture..... do.....	78.6	72.7
Average initial weight per steer..... pounds.....	799.2	828.0
Average final weight per steer..... do.....	1,145.0	1,167.2
Average total gain per steer..... do.....	345.8	339.1
Average daily gain per steer..... do.....	1.79	1.79
Daily feed per steer:		
Corn..... do.....	15.3	16.2
Hay..... do.....	6.2	5.3
Protein meal..... do.....		.9
Pasture..... do.....	Pasture.	Pasture.
Feed consumed per 100 pounds gain:		
Corn..... pounds.....	853	905
Hay..... do.....	343	238
Protein meal..... do.....		51
Pasture..... days.....	23	21

The addition of 0.9 pound of protein meal to corn, legume hay, and pasture did not produce any increase in daily gains over a similar ration which did not include a protein meal. In this comparison it is seen that 0.9 pound of protein meal and approximately 1 pound of corn in addition to the feed used per steer per day in the corn-and-hay ration replaced only 0.8 pound of hay in producing the same amount of gain.

GRAIN, HAY, AND SILAGE RATIONS WITH PASTURE.

Silage rations, in connection with pasture, according to the Corn Belt investigations, did not produce so large daily gains as corn-and-hay rations.

A study of Table 6 shows that the cattle receiving straw produced a trifle larger gains than the hay rations. It should be taken into consideration, however, that the straw did not replace the hay, as 1.5 pounds of protein meal and approximately 1 pound of corn and 5 pounds of silage were required per head per day over that consumed in the corn-and-hay ration to produce practically the same daily gain.

TABLE 6.—Comparison of grain, hay, and silage rations with pasture for fattening steers in the Corn Belt.

Item.	Ration.		
	Corn, hay, and pasture.	Corn, hay, protein meal, silage, and pasture.	Corn, protein meal, straw, silage, and pasture.
Total number of steers fed.....	2,452	4,734	1,077
Number of farms.....	52	100	27
Average number per drove.....	47.2	47.3	39.9
Average length of feed period..... days..	199.5	196.3	191.2
Average number of days on pasture..... do...	77.9	60.8	68.7
Average initial weight per steer..... pounds..	764.7	762	867.3
Average final weight per steer..... do...	1,078.8	1,059	1,173.9
Average total gain per steer..... do...	314.1	297	306.6
Average daily gain per steer..... do...	1.57	1.51	1.6
Daily feed per steer:			
Corn..... do...	8.6	7.7	9.7
Hay..... do...	3.7	3.4	-----
Protein meal..... do...	-----	1.2	1.5
Straw..... do...	-----	-----	3.2
Silage..... do...	22.6	24.2	27.9
Pasture..... days..	Pasture...	Pasture...	Pasture.
Feed consumed per 100 pounds gain:			
Corn..... pounds..	546	509	600
Hay..... do...	234	221	-----
Protein meal..... do...	-----	78	93
Straw..... do...	-----	-----	197
Silage..... do...	1,430	1,605	1,742
Pasture..... days..	25	20	22

In most cases where pasture was used the cattle were grazed without receiving other feed, before they were put into the dry lot. It is customary for many cattle feeders to make their purchases in the late summer or fall and utilize grass and other roughage at the beginning of the feeding period.

Where pasture is available (fig. 7) there are three practical methods of fattening cattle on grass, namely, grass alone, grass and additional feed throughout the entire feeding period, and grass with additional feed the last few months of the feeding period.

The grass season is usually from May to November, inclusive, which is approximately 210 days. Two acres of good pasture are usually allowed per animal. After September the average pasture begins to decrease in value very rapidly, and cattle should be marketed at this time or be given additional feed.

Prevailing prices of corn and concentrates, the type of pasture, and the quality of cattle should largely determine the supplement to pasture, which might be corn alone, corn with a protein supplement,



FIG. 7.—Steers fattened on blue-grass pasture in southwestern Wisconsin. In that section grass is relied upon to produce most of the gain.

or the protein supplement by itself. Methods of fattening cattle on grain are suggested in Table 7.

TABLE 7.—Methods of fattening cattle on grass in the Corn Belt.

Method.	Length of grazing period.	Supplemental feed per day.
	<i>Days.</i>	
Grass alone.....	150	
Grass and corn.....	210	Corn, 10 to 12 pounds.
Grass and cottonseed cake.....	210	Cake, 2½ to 4 pounds.
Grass and corn and cake or linseed meal....	210	Corn, 8 to 10 pounds; cake or meal, 1 to 2 pounds.
Grass 210 days, and corn last 90 days.....	210	Corn, 12 to 15 pounds.
Grass 210 days, and corn and cake or meal last 90 days.....	210	Corn, 10 to 12 pounds; cake or meal, 1½ to 3 pounds.

Where grass alone is depended upon, from four to five months of grazing will usually give best results, because pastures are at their best from June to October.

IMPORTANT MISCELLANEOUS FACTORS.

Labor, equipment, preparation of cattle for shipment, and manure and pork credits, are important factors over which the cattle feeder has considerable influence. Labor may be reduced by having labor-saving devices and by having a convenient arrangement of equipment, so that the actual feeding operation will take as little time as possible. Feed bunks conveniently arranged, feed carriers from silo or cribs to the bunks, and all roughage and bedding placed in a shed convenient to the other equipment are factors which should influence labor. If things are handy around the feed lot, one man can care for a large number of cattle in a short time.

Expensive buildings and equipment devoted exclusively to fattening cattle are unnecessary. In most sections of the Corn Belt a shed having an open side or end is all that is necessary for shelter. If cattle are kept dry and have protection from the winds and storms by having access to a shed they will do very well, other factors being equal. It is advisable to have all feed under cover. A shed having space for hay and for straw (for both feed and bedding) in the center, or on one side, and permitting the cattle to eat these roughages under shed and have a place to lie down in cold weather, is very desirable.

During the 48 hours before shipping, feeds of high protein content or laxative nature should be greatly decreased. This applies to such feeds as silage, legume hays, and protein concentrates. Corn should be decreased about half during the last day of feeding. All dry roughages, with the exception of legume hays, can be supplied in unlimited amounts during this period.

Any feed that has the tendency to be heating to the animal should be reduced. Oats can be substituted for half the corn ration the last two days with good results. Molasses or any other sweet feed in the ration can be fed until shipping time without bad effects.

Salt should be provided at all times. It is bad practice to keep salt away from the cattle for some time and then salt them heavily just before shipping. This practice invariably causes scouring while in transit and the shipper will be the loser.

The amounts and value of the manure and pork produced naturally vary with the character of the ration, the age of the cattle, and the size of the feed lot.

Hogs should follow cattle receiving a grain ration, as a considerable quantity of undigested feed passes through the animals. The extent to which this feed may be used by the hogs depends upon the form in which the grain was fed to the cattle. The pork gains are much greater when the corn or other grains are fed in the whole form. Young cattle use feed more completely and economically than older cattle; hence the amount of pork produced by hogs following them is lower.

One hog weighing 100 to 150 pounds should make satisfactory gains if allowed the droppings from two 2-year-old steers fed a medium to heavy ration of ear corn or shelled corn.

When it is taken into consideration that from 75 to 80 per cent of the fertilizing constituent in feed is returned in the manure, the importance of saving it and applying it to the soil is easily realized.

Steers of 1,000 pounds weight on a fattening ration will void from 65 to 75 pounds of manure per day per head. It may be safely assumed that a ton per month may be expected from a mature steer on a desirable fattening ration.

Provision should be made to save as much manure as possible. Paved feed lots, feeding floors, sheds for shelter, and liberal bedding aid in saving manure.

A carload of cattle should consist of at least 22,000 pounds, as this is the minimum weight for the average stock car of 36 feet in length.

The following statement shows the comparative freight cost on short-weight cars:

Weight of cattle:	Freight cost per 100 pounds.	Weight of cattle:	Freight cost per 100 pounds.
22,000 pounds -----	\$0.340	18,000 pounds -----	\$0.416
21,000 pounds -----	.356	17,000 pounds -----	.440
20,000 pounds -----	.374	16,000 pounds -----	.467
19,000 pounds -----	.394	15,000 pounds -----	.499

The statement shows the importance of having the car loaded to at least minimum weight. When the freight rate is 34 cents per 100 pounds and the minimum weight of cattle is 22,000 pounds, the rate is approximately 50 cents per 100 pounds if only 15,000 pounds are shipped in the car.

Mixed shipments of livestock should be avoided. Mixed shipments of cattle and hogs, or cattle and sheep, frequently result in heavy losses, and always necessitate a marked increase in the freight rate. When two or more kinds of livestock are shipped in the same car, the freight for the carload is usually based on the highest rate and the highest minimum weight.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

November 21, 1923.

<i>Secretary of Agriculture</i> -----	HENRY C. WALLACE.
<i>Assistant Secretary</i> -----	HOWARD M. GORE.
<i>Director of Scientific Work</i> -----	E. D. BALL.
<i>Director of Regulatory Work</i> -----	WALTER G. CAMPBELL.
<i>Director of Extension Work</i> -----	C. W. WARBURTON.
<i>Solicitor</i> -----	R. W. WILLIAMS.
<i>Weather Bureau</i> -----	CHARLES F. MARVIN, <i>Chief</i> .
<i>Bureau of Agricultural Economics</i> -----	HENRY C. TAYLOR, <i>Chief</i> .
<i>Bureau of Animal Industry</i> -----	JOHN R. MOHLER, <i>Chief</i> .
<i>Bureau of Plant Industry</i> -----	WILLIAM A. TAYLOR, <i>Chief</i> .
<i>Forest Service</i> -----	W. B. GREELEY, <i>Chief</i> .
<i>Bureau of Chemistry</i> -----	C. A. BROWNE, <i>Chief</i> .
<i>Bureau of Soils</i> -----	MILTON WHITNEY, <i>Chief</i> .
<i>Bureau of Entomology</i> -----	L. O. HOWARD, <i>Chief</i> .
<i>Bureau of Biological Survey</i> -----	E. W. NELSON, <i>Chief</i> .
<i>Bureau of Public Roads</i> -----	THOMAS H. MACDONALD, <i>Chief</i> .
<i>Bureau of Home Economics</i> -----	LOUISE STANLEY, <i>Chief</i> .
<i>Office of Experiment Stations</i> -----	E. W. ALLEN, <i>Chief</i> .
<i>Fixed Nitrogen Research Laboratory</i> -----	F. G. COTTRELL, <i>Director</i> .
<i>Publications</i> -----	L. J. HAYNES, <i>In Charge</i> .
<i>Library</i> -----	CLARIBEL R. BARNETT, <i>Librarian</i> .
<i>Federal Horticultural Board</i> -----	C. L. MARLATT, <i>Chairman</i> .
<i>Insecticide and Fungicide Board</i> -----	J. K. HAYWOOD, <i>Chairman</i> .
<i>Packers and Stockyards Administration</i> -----	} CHESTER MORRILL, <i>Assistant</i> to the Secretary.
<i>Grain Futures Trading Act Administration</i> -----	

This bulletin is a contribution from

Bureau of Animal Industry----- JOHN R. MOHLER, *Chief*.
Animal Husbandry Division----- L. J. COLE, *Chief*.

18

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.

AT
5 CENTS PER COPY

▽